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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RANDELL L. MILLS

Appeal 2008-3133
Application 09/220,970
Technology Center 2600

Decided: November 28, 2008

Before JAMES D. THOMAS, KENNETH W. HAIRSTON,
and JOHN A. JEFFERY, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

On March 22, 2005, another panel of this Board remanded the present application to the Examiner to consider several matters pertaining to the rejections that were on appeal at that time.[1] Following that remand,

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[1] *Ex Parte Mills*, Appeal No. 2004-0883 (BPAI Mar. 22, 2005) (hereafter "Board Remand"). At that time, six rejections were on appeal, five of which were based on prior art. *See id.* at 4.

prosecution of this application was reopened and the prior art rejections were ultimately withdrawn. The Examiner, however, has since rejected all currently pending claims—claims 51-322—under 35 U.S.C. §§ 101 and 112.

Appellant now appeals these rejections under 35 U.S.C. § 134. We have jurisdiction under 35 U.S.C. § 6(b). We reverse and enter new grounds of rejection under 37 C.F.R. § 41.50(b).

STATEMENT OF THE CASE

Appellant invented a method and system for recognizing a pattern in information. The information is based on certain physical characteristics or their representations and a relationship of those physical characteristics (i.e., a "physical context").

In one implementation, a transducer converts an input signal into information. The input signal is representative of (1) the physical characteristics, and (2) the physical context of an item of interest. The resulting information has two key aspects: (1) data representative of the physical characteristics or representations of physical characteristics, and (2) an "input context" corresponding to the physical context based on the transducer's identity and its particular elements. The information defines a "Fourier series in Fourier space"[2] that represents the item of interest.

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[2] The term "Fourier Series in Fourier Space" is defined as "a sum of trigonometric functions in frequency space where each variable is frequency and the parameters of the Fourier series are input data or processed input data." Board Remand, at 8. This definition was entered into the Specification on Page 6 following the Board's remand. *See* Amendment filed May 3, 2005; *see also* App. Br. 2; Ans. 6.

To this end, data are encoded as parameters of multiple Fourier components in Fourier space which are added together to form at least one Fourier series in Fourier space. The Fourier series in Fourier space is expressed mathematically as a two-dimensional expression.[3]

This series is sampled and modulated with a filter to form a modulated Fourier series that forms the basis for determining spectral similarity between the modulated Fourier series and another Fourier series. Based on the spectral similarity, a probability expectation value and a probability operand[4] are generated. Pattern recognition is obtained when the value of the probability operand has a desired value.[5] Claims 51 and 313 are illustrative:

51. A method for recognizing a pattern in information comprising data, the method comprising:

inputting data;

encoding data as parameters of a plurality of Fourier components in Fourier space;

adding at least two of said Fourier components together to form at least one Fourier series in Fourier space;

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[3] *See* Spec. 8:25-29 (standard equation for Fourier series in Fourier space); *see also* Spec. 10:4-9 (alternate equation for Fourier series in Fourier space).

[4] The term "probability operand" is defined as "a system that returns a binary number in response to a probability-expectation-value or activation-probability-parameter input according to a specific statistic. The value of the operand causes a specific action, such as adding Fourier series to form a string, storing a summed Fourier series to memory, or activating a component of the system." This definition was also entered into the Specification on Page 6 following the Board's remand. *See* Amendment filed May 3, 2005.

[5] *See generally* Spec. 6:25-23:21; Figs. 1-5.

sampling at least one of said Fourier series in Fourier space with a filter to form a sampled Fourier series;

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

determining a spectral similarity between said modulated Fourier series and another Fourier series;

determining a probability expectation value based on said spectral similarity;

generating a probability operand based on said probability expectation value;

selecting a desired value for said probability operand, wherein recognition of a pattern in said information is obtained when said probability operand having said desired value; and

outputting a recognized pattern.

313. A data structure in a memory for access by a computer program for efficient recognition of a pattern in information comprising data stored in the memory, the data structure comprising:

a plurality of transduced data objects, each of said plurality of transduced data objects providing an input data object representative of characteristics received from a respective one of a plurality of transducers acting on a signal provided by characteristics encoded as a Fourier series in Fourier space, wherein said input data objects allows associations among and relational pattern of said input data objects by spectral analysis to achieve recognition of a pattern in information, while preserving input context of said input signal including an identity of said respective one of said plurality of transducers.

Claims 307-322[6] stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Claims 51-322 stand rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the enablement requirement.

Claims 51-322 stand rejected under 35 U.S.C. § 101 as being non operational and lacking utility.

Rather than repeat the arguments of Appellant or the Examiner, we refer to the Briefs and the Answer[7] for their respective details. In this decision, we have considered only those arguments actually made by Appellant. Arguments which Appellant could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

The § 101 Rejection of Claims 307-322

Regarding the Examiner's rejection of claims 307-322 under § 101, the Examiner takes the position that while the claimed invention recites a data structure stored in memory, the data structure is merely a collection of data values and thus constitutes non-functional descriptive material (Ans. 3-4, 22-24).

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[6] Although the initial statement of the rejection includes only claims 313, 314, and 316-322 (Ans. 3), the body of the rejection nevertheless includes claims 307-322 (Ans. 3-4) as does the discussion pertaining to this rejection in the "Response to Arguments" section of the Examiner's Answer (Ans. 21-22). Likewise, Appellant's arguments pertaining to this rejection include claims 307-322 (App. Br. 36; Reply Br. 33-34). Accordingly, we presume that the Examiner intended to include claims 307-322 in this rejection.

[7] We refer to (1) the Appeal Brief filed September 21, 2007; (2) the Examiner's Answer mailed December 12, 2007; and (3) the Reply Brief filed February 11, 2008.

Appellant argues that the data are functional. According to Appellant, data from a physical detector is processed to form a representation of the information contained in the form of a Fourier series in Fourier space. This data, Appellant argues, are used as parameters that are input to the system to achieve pattern recognition and processing (App. Br. 37-38). Appellant emphasizes that the essential feature of the data structure is that it *encodes the physical characteristics and context* of the data based on the organization or structure and formatting of the stored data parameters. This feature is said to be essential for subsequent processing and pattern recognition and is absent from raw data (e.g., conventional stored pixel data) (Reply Br. 42).

The Enablement Rejection

Regarding the Examiner's enablement rejection of claims 51-322 (Ans. 5-8), the Examiner contends that after summation of Fourier Series to form $V_{\Sigma s,m}(k_\rho, k_z)$, this expression does not carry the index information for each Fourier series (s) nor element (m). As a consequence, the Examiner asserts that no mathematical operation can be applied to each Fourier component or Fourier series after a string is formed (Ans. 7).

The Examiner acknowledges that the equation on Page 15 of the Specification can be carried out when all data parameters are known (Ans. 17). The Examiner, however, questions how the equation can be carried out on the sampled Fourier series without being indexed to (m) and without the requisite data parameters needed to carry out the subsequent sampling and modulation processes for producing subsequent strings. According to the Examiner, the series would have lost the needed information for these computations (Ans. 17-18).

Appellant notes that the equation on Page 17 of the Answer provided in support of the Examiner's position is the Fourier transform of a finite train of voltage pulses—not the Fourier series in Fourier space parameterized by data as in the claimed invention (Reply Br. 15). Appellant emphasizes that the Examiner's reliance on Fourier representations of signals (i.e., a conventional Fourier transform of a finite train of voltage pulses) is not equivalent to—and indeed totally different from—the claimed invention which utilizes a Fourier series in Fourier space parameterized with the data (Reply Br. 16, 19, 20).

Appellant adds that the data parameters are in fact preserved in the memory structure as disclosed in the originally filed application. In one embodiment, Appellant notes that determining spectral similarity merely involves acquiring the data parameters from their specific memory locations and plugging them into the equations according to the data structure and their respective designations in those equations (Reply Br. 17-19). Likewise, Appellant notes that the probability expectation value in the equation on page 14 of the Specification is also calculated by taking the data parameters from memory at their specific memory locations and plugging them into the equations as designated (Reply Br. 19).

The § 101 Rejection of Claims 51-322

Regarding the Examiner's § 101 rejection of claims 51-322 as lacking utility, the Examiner refers to Equation 37.109 on Page 40 of the Specification as indicating how a time function can be delayed by multiplying an exponential factor $e^{-j2\Pi f_0}$ to each corresponding component $e^{j2\Pi f}$ in Fourier space (Ans. 9). According to the Examiner, a key step in

storing different Fourier components or series in different memories with defined delay information for subsequent recall and association is that the exponential multiplying factor noted above must have the same frequency as that of the corresponding component (Ans. 9-10).

The Examiner then refers to the Fourier series in Fourier space equation on Page 11 of the Specification and contends that this equation cannot produce the requisite delay. According to the Examiner, the first sine function in this equation has two frequencies (i.e., both positive and negative f), but the exponential factor in this equation (i.e., in front of the first sine function) corresponds to only one frequency—the positive frequency (Ans. 10, 19, 20). The Examiner further contends that the multiplication factor for generating delay does not have the same frequency and notes that the equation on Page 11 of the Specification has a frequency that depends on data parameters that can vary from measurement to measurement and allegedly cannot generate any delayed form of its corresponding function on Page 8 (Ans. 10-11).

Appellant argues that the Examiner's position is once again based on conventional Fourier series analysis and, in any event, the range of frequency "f" in the referenced equations is not two exact frequencies as the Examiner posits, but rather a free running variable in Fourier space. Appellant adds that the data parameters modify these variables in the modulation factor and the Fourier terms (App. Br. 56-57).

Appellant reiterates that the Fourier series in Fourier space is not an application of conventional Fourier transforms (i.e., a transform of a continuous time signal), but rather a formula comprising a series of weighted sine and cosine terms and modulation factors parameterized with data

parameters in a specified manner. According to Appellant, this allows processing of two or more of such data-parameterized constructs to determine spectral similarities in the constructs so that the data structure is modified according to the outcome (Reply Br. 23). Appellant emphasizes that the Fourier series in Fourier space parameterized with data does not delay a waveform in the traditional sense of a Fourier series, but rather is modulated by frequency functions also parameterized with data, where each modulation function is mathematically equivalent to a corresponding time delay (Reply Br. 26).

ISSUES

The issues before us, then, are:

(1) Has Appellant shown that the Examiner erred in finding that the data structure stored in memory recited in independent claims 307 and 313 constitutes non-functional descriptive material and therefore non-statutory subject matter under § 101?

(2) Has Appellant shown that the Examiner erred in finding that claims 51-322 fail to comply with the enablement requirement under § 112, ¶ 1? This issue turns on whether the disclosure would enable ordinarily skilled artisans to make and/or use the claimed invention which utilizes a Fourier series in Fourier space parameterized with the data without undue experimentation.

(3) Has Appellant shown that the Examiner erred in finding that the claimed invention lacks utility under § 101? This issue turns on whether the disclosed pattern recognition techniques utilizing a Fourier series in Fourier

space parameterized by data yield an operative invention that satisfies the utility requirement under § 101.

For the following reasons, we find that Appellant has shown such error.

ANALYSIS

The § 101 Rejection of Claims 307-322

We first address the Examiner's § 101 rejection of claims 307-322. At the outset, we note that the preambles of independent claims 307 and 313 clearly and unambiguously recite a *data structure in a memory* for access by a computer program for efficient recognition of a pattern in information comprising data stored in the memory. The claims further recite particular aspects of this data structure which comprises, among other things, plural memory data objects stored in memory registers corresponding to input data objects representative of characteristics received from a transducer.

A "'data structure' is defined as a physical or logical relationship among data elements, designed to support specific data manipulation functions." *In re Warmerdam*, 33 F.3d 1354, 1361-62 (Fed. Cir. 1994) (citation and internal quotation marks omitted). As such, data structures are considered functional descriptive material that imparts functionality when employed as a computer component. Manual of Patent Examining Procedure § 2106.01, Rev. 6, Sept. 2007 ("MPEP").

Based on the recited pattern recognition functionality, we agree with Appellant that, when considering the data structure of claims 307 and 313 as

a whole,[8] it constitutes functional descriptive material. When accessed by a computer, we see no reason why the recited data structure would not permit the recited pattern recognition functionality to be realized.

To be sure, merely claiming functional descriptive material such as data structures, without more, does not pass muster under § 101.[9] But this is not the case here.[10] As we noted above, claims 307 and 313 expressly recite that the data structure is *in a memory*. While this distinction is not dispositive with respect to our § 101 inquiry, data structures stored in memory can render an otherwise non-statutory data structure into patentable subject matter.

The data structures stored in memory in *In re Lowry*, 32 F.3d 1579 (Fed. Cir. 1994) are illustrative. In that case, the data structures imposed a physical organization on the stored data. *Id.* at 1583. The data structures were held to be "more than mere abstraction,…[but] specific electrical or magnetic structural elements in a memory[,]...physical entities that provide increased efficiency in computer operation." *Id.* at 1583-84.

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[8] *See Diamond v. Diehr*, 450 U.S. 175, 188 (1981) ("In determining the eligibility of respondents' claimed process for patent protection under § 101, their claims must be considered as a whole.").

[9] *See, e.g.*, *Warmerdam*, 33 F.3d at 1361-62 (claim reciting data structure per se held to be unpatentable under § 101); *see also* MPEP § 2106.01(I) ("Data structures not claimed as embodied in computer-readable media are descriptive material *per se* and are not statutory because they are not capable of causing functional change in the computer.").

[10] In the prior remand to the Examiner, the earlier panel noted that if the § 101 rejection was to be repeated, then the Examiner should point out how the data structures of claims 307 and 313 are considered as *data structures per se*. Board Remand, at 11-12 (emphasis added).

Although we do not find that the data structures in memory recited in claims 307 and 313 impart a physical dimension to the claims as did the data structures in *Lowry*, we nonetheless disagree with the Examiner's contention (Ans. 22-24) that the recited data structures constitute non-functional descriptive material. Unlike non-functional descriptive material, the stored data structures of claims 307 and 313 enable certain functionality of the computer to be realized when accessed—namely, the computer's pattern recognition functionality. This functionality of the data structure is, in our view, the very essence of *functional* descriptive material.

As such, the Examiner's basis for rejecting claims 307 and 313 under § 101 is not well founded. That said, however, we agree with the Examiner that these claims do not recite statutory subject matter under § 101 as we indicate in the new ground of rejection.[11] It is the Examiner's rationale for that conclusion that we find unsupportable.

For the foregoing reasons, Appellant has persuaded us of error in the Examiner's rejection of independent claims 307 and 313. Therefore, we will not sustain the Examiner's rejection of those claims, and dependent claims 308-312 and 314-322 for similar reasons.

The Enablement Rejection

Based on the record before us, we will also not sustain the Examiner's enablement rejection of claims 51-322 essentially for the reasons provided by Appellant. As Appellant indicates, the Examiner's analysis pertaining to the alleged non-enablement of the invention is simply not based on the

[11] *See* p. 15-25, *supra*, of this opinion (rejecting claims 307 and 313 under § 101 based on new grounds).

fundamental aspect of the claimed invention—the Fourier series in Fourier space parameterized by data as the term is defined on this record.[12] Rather, we are persuaded that the Examiner's position is based on conventional Fourier transform analysis which, as Appellant indicates, is simply not equivalent to the recited Fourier series in Fourier space which represents a particular two-dimensional expression consistent with Appellant's definition.[13]

Furthermore, we see no reason why the respective data parameters used to determine spectral similarity and probability expectation value would not merely be retrieved from their associated memory locations and plugged into the appropriate equations as Appellant indicates. We agree with Appellant that merely by retrieving these parameters from memory would not result in losing these parameters such that they would be unavailable for future calculations as the Examiner seems to suggest. Despite the Examiner's assertions to the contrary, on the record before us, we see no reason why the data parameters would not be preserved in the memory structure as Appellant indicates (Reply Br. 16).

While we appreciate the Examiner's mathematical rigor in attempting to identify the alleged problems with the analytical basis for the claimed invention, we nonetheless find that the originally-filed disclosure would enable ordinarily skilled artisans to make and/or use the claimed invention without undue experimentation. Thus, Appellant has persuaded us of error

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[12] *See* n.2, *supra*, of this opinion; *see also* Board Remand, at 8; Ans. 6.
[13] *See* Spec. 8:25-29 (standard equation for Fourier series in Fourier space); *see also* Spec. 10:4-9 (alternate equation for Fourier series in Fourier space).

in the Examiner's enablement rejection of claims 51-322. Therefore, we will not sustain the Examiner's rejections of those claims.

The § 101 Rejection of Claims 51-322

We now address the Examiner's § 101 rejection of claims 51-322 as lacking utility (Ans. 9-11). An inoperative invention is not "useful" under § 101. *In re Harwood*, 390 F.2d 985, 989 (CCPA 1968). But the claimed invention "must be *totally incapable* of achieving a useful result" to violate § 101. *Brooktree Corp. v. Adv. Micro Devices, Inc.*, 977 F.2d 1555, 1571 (Fed. Cir. 1992) (emphasis added). As such, we must presume the utility of the present disclosure unless there is a reason "to question the objective truth of the statement of utility or its scope." *In re Langer*, 503 F.2d 1380, 1391 (CCPA 1974).

Based on the record before us, we find the disclosed pattern recognition techniques utilizing a Fourier series in Fourier space parameterized by data yield an operative invention that satisfies the utility requirement under § 101. As Appellant indicates, the pattern recognition techniques utilizing a Fourier series in Fourier space as defined on this record is not an application of conventional Fourier transforms. Rather, it is a formula comprising a series of weighted sine and cosine terms and modulation factors parameterized with data parameters in a specified manner that allows processing of two or more of such data-parameterized constructs to determine spectral similarities in the constructs so that the data structure is modified according to the outcome (Reply Br. 23). The Examiner's arguments pertaining to conventional Fourier transforms are simply not germane to the particular aspects of the Fourier series in Fourier space

equations as Appellant indicates. Moreover, we find Appellant's explanation of the analytical basis for this technique based on these equations and responses to the Examiner's challenges to the operability of the invention (Reply Br. 20-33) persuasive and reasonably supported by the identified passages in the Specification. We are therefore convinced the claimed invention is not totally incapable of achieving a useful result under the *Brooktree* standard to violate § 101.

For the foregoing reasons, Appellant has persuaded us of error in the Examiner's rejection of claims 51-322 under § 101 as lacking utility. Therefore, we will not sustain the Examiner's rejection of those claims.

NEW GROUND OF REJECTION UNDER 37 C.F.R. § 41.50(b)

Under 37 C.F.R. § 41.50(b), we enter a new ground of rejection under 35 U.S.C. § 101.

Claims 51, 118, 127, 156, 157, 160, 228, 237, 266, 267, 270, 271, 281, 285, 290, 294, 299, 304, 307, and 313 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Under § 101, there are four categories of subject matter that are eligible for patent protection: (1) processes; (2) machines; (3) manufactures; and (4) compositions of matter. 35 U.S.C. § 101. While the scope of patentable subject matter encompassed by § 101 is "extremely broad" and intended to "include anything under the sun that is made by man," it is by no means unlimited. *In re Comiskey*, 499 F.3d 1365, 1375 (Fed. Cir. 2007) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980)). For example, laws of nature, abstract ideas, and natural phenomena are excluded from patent protection. *Diamond v. Diehr*, 450 U.S. 175, 188 (1981).

It is the second exclusion noted above—abstract ideas—that is relevant to the appeal before us. Thus, even if the claimed invention nominally recites subject matter that falls within the enumerated categories under § 101, the claimed invention would still not recite patentable subject matter if the claim as a whole is nonetheless directed to an abstract idea.

As the U.S. Supreme Court has noted, "'[a]n idea of itself is not patentable[]'....'A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.'" *Id.* at 185 (citations omitted).

In determining whether a claim as a whole is directed to an abstract idea, the Court has drawn a key distinction between (1) claims that seek to wholly pre-empt the use of a fundamental principle, and (2) claims that are merely limited to foreclosing others from using a particular *application* of that fundamental principle. *See In re Bilski*, No. 2007-1130, 2008 WL 4757110, at *5 (Fed. Cir. Oct. 30, 2008) (en banc).

In *Gottschalk v. Benson*, 409 U.S. 63 (1972), the Court held claims directed to a method for converting binary-coded-decimal (BCD) numerals into pure binary numerals for use with a general-purpose digital computer as nonstatutory under § 101. In reaching this conclusion, the Court found that the process claim was "so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion." *Id.* at 68. The Court further noted that "[t]he mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." *Id.* at 71-72.

Six years later, the Court in *Parker v. Flook*, 437 U.S. 584 (1978), held that a claimed method of updating the value of an alarm limit on at least one process variable involved in a catalytic conversion process was not statutory subject matter under § 101. *Flook*, 437 U.S. at 594-96. In reaching this conclusion, the Court in *Flook* noted that the recited "alarm limit" was merely a number, and the method essentially consisted of three steps: (1) measuring the present value of the process variable; (2) using an algorithm to calculate an updated alarm-limit value; and (3) adjusting the alarm limit to the updated value. *Id.* at 585.[14] Notably, the Court emphasized that while the claims in that case "cover[ed] a broad range of potential uses of the method" (e.g., in the petrochemical and oil-refining industries), the claims nonetheless did not cover every conceivable application of the formula. *Id.* at 586.

The pre-emption concept becomes strikingly clear when comparing the *Flook* and *Benson* cases with *Diehr*. In *Diehr*, the claimed invention was directed to a process for curing synthetic rubber. The Court held that a physical and chemical process for molding precision synthetic rubber products was statutory subject matter under § 101 because the claims involve a transformation of an article to a different state or thing and "[i]ndustrial processes such as this are the types which historically been eligible to received the protection of our patent laws." *Diehr*, 450 U.S. at 184.

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[14] The Court acknowledged that even though these computations could be done by hand, the disclosure nonetheless indicated that the formula was "primarily useful for computerized calculations producing automatic adjustments in alarm settings." *Id.* at 586.

In contrast to the facts in *Flook*, the Court noted:

> [R]espondents here do not seek to patent a mathematical formula. Instead, they seek patent protection for *a process of curing synthetic rubber*. Their process admittedly employs a well-known mathematical equation, *but they do not seek to pre-empt the use of that equation*. Rather, they seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process. These include installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time.

Id. at 187 (emphasis added).

Unlike the processes in *Benson* and *Flook*, the process in *Diehr* was limited to a particular physical industrial process (i.e., a process for curing synthetic rubber). Although this process employed a mathematical equation, the claim nonetheless recited steps that were germane to that particular physical process (i.e., installing rubber in the press, closing the mold, constantly determining its temperature, constantly recalculating the appropriate cure time using the formula, and automatically opening the press). As such, the claimed invention in *Diehr* did not pre-empt the use of the mathematical equation involved, but merely covered the use of the equation in conjunction with the other recited steps of that particular physical rubber curing process.

Based on these precedents, an en banc panel of the Court of Appeals for the Federal Circuit recently restated the U.S. Supreme Court's "definitive

test to determine whether a process claim is tailored narrowly enough to encompass only a particular application of a fundamental principle rather than to pre-empt the priniciple itself." This restatement, embodied as the "machine-or-transformation test," requires that a claimed process either (1) be tied to a particular machine or apparatus, or (2) transform a particular article into a different state or thing. *In re Bilski*, No. 2007-1130, 2008 WL 4757110, at *5 (Fed. Cir. Oct. 30, 2008) (en banc). This test ensures that the claimed process does not pre-empt uses of the principle that do not use the specified machine or apparatus. The test further precludes a claimed process from pre-empting "the use of the principle to transform any other article, to transform the same article but in a manner not covered by the claim, or to do anything other than transform the specified article." *Id.*

With these principles in mind, we turn to the claims on appeal before us. Independent claim 51 is directed to a method of recognizing a pattern in information comprising, among other things, encoding inputted data as parameters of Fourier components in Fourier space, adding at least two of these parameters together to form at least one Fourier series in Fourier space, sampling the at least one Fourier series in Fourier space with a filter, and modulating the sampled Fourier series in Fourier space with the filter. The claim then calls for determining spectral similarity between the modulated Fourier series and another Fourier series to determine a probability expectation value. Based on this value, a probability operand is generated which is used as a basis for outputting a recognized pattern in the information.

Interpreting independent claim 51 as a whole,[15] we find the steps recited are not tied to a particular machine or apparatus, nor do they transform a particular article into a different state or thing. Rather, the claim merely recites a computation method that outputs a "recognized pattern" in the information—a result that, while useful, is merely the result of a calculation.

First, independent claim 51 is not tied to a particular machine or apparatus. Claim 51 effectively recites a method that recognizes a pattern in information by various mathematical manipulations of data and performing particular computations with respect to that data. As such, the method steps of claim 51 are directed only to a manipulation of abstract ideas implemented by any machine that calculates (e.g., a general purpose computer). Thus, even if we assume, without deciding, that a machine is required to implement the process of claim 51 (i.e., the process is tied to a machine), the recited steps are not tied to a *particular* machine as *Bilski* requires.

Claim 51 does recite a "filter" that samples the Fourier series in Fourier space and modulates the same, and the Specification indicates that filter 34 performs these functions (Spec. 13:7-9). According to the Specification, filter 34 can be a time delayed Gaussian filter with multiple cascaded stages where each stage has a decaying exponential system function between stages (Spec. 13:27-33). Nevertheless, given its calculation functions with respect to the claimed invention, the recited filter

[15] *See Diamond v. Diehr*, 450 U.S. 175, 188 (1981) ("In determining the eligibility of respondents' claimed process for patent protection under § 101, their claims must be considered as a whole.").

(like the other disclosed calculating components that implement the recited method steps) is tantamount to a computation element or mathematical function for performing the requisite calculations on the determined Fourier series in Fourier space.

As such, the nominal recitation of this computation element or mathematical function (i.e., the filter) in claim 51 does not render the claim statutory. Moreover, even if we assume, without deciding, that the filter has some sort of structure, such "[n]ominal recitations of structure in an otherwise ineligible method fail to make the method a statutory process." *Ex parte Langemyr*, App. No. 2008-1495, at 20 (BPAI May 28, 2008) (Informative) (citing *Benson*, 409 U.S. at 71-72), *available at* http://www.uspto.gov/web/offices/dcom/bpai/informative_opinions.html (last visited Sept. 12, 2008). We reach the same conclusion with respect to independent claims 118, 127, and 294 which call for multiple filters.

Nor does the recited process transform a particular article into a different state or thing. Given the nature of the process of claim 51, the article to be transformed would, at best, comprise electronically-manipulated data. Apart from this data, there are simply no physical objects or substances recited that would constitute an article. We therefore must determine whether the recited manipulations of this data constitute the requisite transformation of a particular article under *Bilski*.

Bilski does recognize that certain types of data can be transformed to meet the transformation test. For example, the court cites the X-ray attenuation data in *In re Abele*, 684 F.2d 902 (CCPA 1982) which not only represented physical and tangible objects, but was also transformed into a

particular visual depiction of a physical object on a display. *Bilski*, 2008 WL 4757110, at *12.

The data recited in claim 51, however, hardly rises to this level of physical representation, let alone transformation into a different state or thing (e.g., a particular visual depiction on a display) as *Bilski* requires. The claim is simply devoid of any such transformation.

In reaching this conclusion, we recognize that Appellant's Specification notes that the present invention derives information from a transducer—information that includes data representative of physical characteristics and an "input context" corresponding to various physical characteristics (i.e., a "physical context" based on the transducer's identity or its particular elements) (Spec. 6:27–7:3). While this description indicates that the data represents physical phenomena, this aspect of the data is not recited in independent claim 51. But even if such a physical representation were recited in claim 51,[16] the claim would still fail under the transformation test as this data would not be transformed into a different state or thing (e.g., a particular visual depiction of a physical object on a display as noted in *Bilski* or some other distinct transformation).

Turning to the specific steps of claim 51, we find that the step of encoding the data likewise falls well short of transforming the data to a different state or thing in the manner required by *Bilski*. Moreover, the initial step of inputting data is tantamount to data gathering steps or

[16] Independent claims 156, 270, 307, and 313 do, however, recite that at least some aspects of the data are representative of physical characteristics. Nevertheless, for the reasons indicated in this opinion, we still fail to see how this characterization, without more, renders these claims statutory over an otherwise unpatentable abstract idea.

insignificant extra-solution activity.[17] The final step of merely outputting a recognized pattern is likewise insignificant extra-solution activity. *See Flook*, 437 U.S. at 588-90 (insignificant post-solution activity step found to be insufficient to impart patentability). In our view, merely outputting a recognized pattern in the final step of claim 51 is tantamount to the alarm limit found to be unpatentable in *Flook*. Therefore, the process of claim 51 does not transform a particular article into a different state or thing.

For the foregoing reasons, claim 51 essentially recites a series of calculations that, in effect, wholly pre-empts all uses of this abstract idea such that the practical effect would be a patent on the idea itself. *See Benson*, 409 U.S. at 71-72; *see also Diehr*, 450 U.S. at 175. Put another way, the recited method steps of claim 51 describe nothing more than the manipulation of basic mathematical constructs—the paradigmatic "abstract idea." *See In re Warmerdam*, 33 F.3d 1354, 1360 (Fed. Cir. 1994). As such, claim 51 does not recite statutory subject matter under § 101.

We also reject independent method claims 118, 127, 157, 271, 285, and 294 for similar reasons. We acknowledge, however, that claims 127, 157, 271, and 294 call for storing various parameters or series associated with the recited methods in memory. But nominal or token recitations of physical structure in a claim and claims reciting incidental physical transformations do not convert an otherwise ineligible claim into an eligible one. *See, e.g.*, *Comiskey*, 499 F.3d at 1380 ("the mere use of the machine to collect data necessary for application of the mental process may not make

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[17] *See Bilski,* 2008 WL 4757110, at *11 ("[T]he involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity."); *see also id.* at *12 (characterizing data gathering steps as insignificant extra-solution activity).

the claim patentable subject matter") (citing *In re Grams*, 888 F.2d 835, 839-40 (Fed. Cir. 1989)).

Merely storing mathematical constructs and parameters in a memory as recited in claims 127, 157, 271, and 294 is only a nominal structural recitation that does not tie the process to a particular machine or apparatus as required by *Bilski*. Indeed, we find that this nominal recitation of physical structure in these claims no different than the recitation of storing binary coded decimal signals in a shift register that the U.S. Supreme Court found to be unpatentable in *Benson*. *See Benson*, 409 U.S. at 73 (listing claim 8 which calls for, in pertinent part, "storing the binary coded decimal signals in a reentrant shift register").

Independent claims 156 and 281 call for a *system* for recognizing a pattern in information comprising data with various recited "layers" with particular functions associated with the recited functionality and a memory. Apart from this recited memory, however, the "system" of these claims is not recited in terms of hardware or tangible structural elements. Rather, the recited layers could very well be implemented solely in software or algorithms. Furthermore, the nominal recitation of a memory in these claims—like the shift register in *Benson*—does not transform this unpatentable abstraction into patentable subject matter under § 101.

Independent claims 160, 228, 237,[18] 290, and 299 are directed to a computer readable medium having stored thereon a computer program for

[18] In the Claims Appendix of the Brief, claims 160, 228, and 237 each include an apparent typographical error ("(Previously Presented)") in line 2. We deem this error harmless as it does not affect the scope of the claim nor our analysis pertaining to the claims' recited limitations.

performing the recited pattern recognition steps commensurate with those discussed previously.

Merely reciting a "system" or "data structure in memory" for implementing the pattern recognition method as claimed, or placing instructions on a computer readable medium to perform this method does not, in our view, transform the recited subject matter from an ineligible "abstract idea" to patentable subject matter. We see no reason why implementing the otherwise ineligible method via a system or data structure in memory should be treated any differently from the methods found to be unpatentable noted above. *See In re Alappat*, 33 F.3d 1526, 1542 ("*Benson*…applies equally whether an invention is claimed as an apparatus or process, because the form of the claim is often an exercise in drafting.").

Nor do we see any reason why merely placing instructions on a computer readable medium that, when executed, cause a computer to engage in manipulations of abstract ideas should be treated any differently from these unpatentable methods.[19] While a computer-readable medium may nominally recite an article of manufacture, merely placing abstractions on such an article does not, in our view, somehow transform that article into a *specific or particular* article of manufacture that would pass muster under § 101. Such a practice would merely exalt form over substance. *See In re Nuijten*, 500 F.3d 1346 (Fed. Cir. 2007), *petition for en banc reh'g denied*, 515 F.3d 1361 (Fed. Cir. 2008) (J. Linn, dissenting) ("The distinctions that

[19] We note in passing that the claim is not directed to a computer or machine loaded with and/or executing the software. We are not saying, however, that this distinction would necessarily be patentable in this case either. Nonetheless, such a machine claim is not before us, and we decline to rule on whether such a claim would recite statutory subject matter.

are drawn between signals and storage media containing those signals would appear to apply equally to the distinctions between software and hardware and are *artificial at best*.") (emphasis added).

As in the method claims, the body of claims 160, 228, 237, 290, and 299 recites process steps that describe nothing more than the manipulation of based mathematical constructs, and the claimed outputting step is insignificant extra-solution activity. There is also no transformation in the subject matter of these claims since they merely recite instructions stored on a computer readable medium.

For the foregoing reasons, we find independent claims 51, 118, 127, 156, 157, 160, 228, 237, 266, 267, 270, 271, 281, 285, 290, 294, 299, 304, 307, and 313 do not recite statutory subject matter under § 101. Although we decline to reject every claim under our discretionary authority under 37 C.F.R. 41.50(b), we emphasize that our decision does not mean the remaining claims are patentable. Rather, we merely leave the patentability determination of these remaining claims to the Examiner. *See* MPEP § 1213.02.

CONCLUSIONS OF LAW

Appellant has shown that the Examiner erred in rejecting (1) independent claims 307 and 313 under § 101 on the basis that the recited subject matter constitutes non-functional descriptive material; (2) claims 51-322 under § 112; and (3) claims 51-322 under § 101 as lacking utility.

We, however, find that the independent claims on appeal are unpatentable under § 101 as being directed to non-statutory subject matter.

DECISION

The Examiner's decision rejecting claims 51-322 is reversed. We have also entered a new ground of rejection for independent claims 51, 118, 127, 156, 157, 160, 228, 237, 266, 267, 270, 271, 281, 285, 290, 294, 299, 304, 307, and 313 under § 101.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). This Section provides that "[a] new ground of rejection . . . shall not be considered final for judicial review."

Section 41.50(b) also provides that the Appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .
>
> (2) Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

REVERSED
37 C.F.R. § 41.50(b)

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